What is Claimed is:

[c1] 1. A method to determine the memory requirements of an application running in parallel on the system, comprising the steps of:

inputting a model and initializing a computational domain;

calculating a data density for each control element;

calculating demand cost for each sub-domain;

minimizing the difference in average demand cost;

ranking the processors by value; and

generating a data ownership table and frame file.

[c2] 2. The method of claim 1, wherein the model is a discretized system model of a physical system.

[c3] 3. The method of claim 1, wherein initializing a computational domain also comprises dividing the domain into a number of equal sized geographic sub-domains with respect to the space coordinates of the model.

[c4] 4. The method of claim 3, wherein initializing a computational domain also comprises dividing the sub-domains into an integer fraction of rows and/or columns.

[c5] 5. The method of claim 1 wherein data density within the sub-domains is represented by linear, area, and volume data demand functions.

[c6] 6. The method of claim 1 wherein the demand cost is an area under a data density curve and is calculated by a numerical integration method.

[c7] 7. The method of claim 1 wherein minimizing the difference in average demand cost also comprises adjusting the sub-domain size by "moving" bisectors.

[c8] 8. The method of claim 7 wherein minimizing the difference in average demand cost also comprises recomputing data density based on a grid in each size adjusted sub-domain.

[c9] 9. A system of networked computers having a plurality of processors and an operating system for executing a target parallel application process using at

least a subset of said plurality of processors, wherein said system includes a method to determine the memory requirements of an application running in parallel on the system, said method comprising:

inputting a model and initializing a computational domain;

calculating a data density for each control element;

calculating demand cost for each sub-domain;

minimizing the difference in average demand cost;

ranking the processors by value; and

generating a data ownership table and frame file.

[c10] 10. The method of claim 9, wherein the model is a discretized system model of a physical system.

[c11] 11. The method of claim 9, wherein initializing a computational domain also comprises dividing the domain into a number of equal sized geographic sub-domains with respect to the space coordinates of the model.

[c12] 12. The method of claim 11, wherein initializing a computational domain also comprises dividing the sub-domains into an integer fraction of rows and/or columns.

[c13] 13. The method of claim 9 wherein data density within the sub-domains is represented by linear, area, and volume data demand functions.

[c14] 14. The method of claim 9 wherein the demand cost is an area under a data density curve and is calculated by a numerical integration method.

[c15] 15. The method of claim 9 wherein minimizing the difference in average demand cost also comprises adjusting the sub-domain size by "moving" bisectors.

[c16] 16. The method of claim 15 wherein minimizing the difference in average demand cost also comprises recomputing data density based on a grid in each size adjusted sub-domain.

[c17] 17. A signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to determine

the memory requirements of an application running in parallel on the system, said machine-readable instructions comprising:

inputting a model and initializing a computational domain;

calculating a data density for each control element;

calculating demand cost for each sub-domain;

minimizing the difference in average demand cost;

ranking the processors by value; and

generating a data ownership table and frame file.

[c18] 18. The method of claim 17, wherein the model is a discretized system model of a physical system.

[c19] 19. The method of claim 17, wherein initializing a computational domain also comprises dividing the domain into a number of equal sized geographic sub-domains with respect to the space coordinates of the model.

[c20] 20. The method of claim 19, wherein initializing a computational domain also comprises dividing the sub-domains into an integer fraction of rows and/or columns.

[c21] 21. The method of claim 17 wherein data density within the sub-domains is represented by linear, area, and volume data demand functions.

[c22] 22. The method of claim 17 wherein the demand cost is an area under a data density curve and is calculated by a numerical integration method.

[c23] 23. The method of claim 17 wherein minimizing the difference in average demand cost also comprises adjusting the sub-domain size by "moving" bisectors.

[c24] 24. The method of claim 24 wherein minimizing the difference in average demand cost also comprises recomputing data density based on a grid in each size adjusted sub-domain.